Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Blue Mounds

B. Facility Name: Blue Mounds Wastewater Treatment Facility

C. Submitted by: Wisconsin Department of Natural Resources

D. State: Wisconsin **Substance:** Chloride **Date completed:** June 19, 2020

E. Permit #: WI-0031658-08 **WQSTS #:** (EPA USE ONLY)

F. Duration of Variance **Start Date:** January 01, 2021 **End Date:** December 31, 2025

G. Date of Variance Application: October 03, 2018

H. Is this permit a: ☐ **First time submittal for variance**
☒ **Renewal of a previous submittal for variance** *(Complete Section IX)*

I. Description of proposed variance: This is a proposed variance from the chronic toxicity criteria (CTC) for chloride of 395 mg/L with a calculated weekly average limit of 400 mg/L. The proposed variance limit is 470 mg/L as a weekly average that would be granted under the condition that Deerfield follow a schedule to implement its updated chloride source reduction measures plan.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sean Spencer	Sean.Spencer@wisconsin.gov	608-275-7775	Permit Drafter
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Sarah Luck	Sarah.Luck@wisconsin.gov	608-275-3230	Parts II D-H and J

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride

B. List other criteria likely to be affected by variance: None

C. Source of Substance: Residential, commercial and institutional water softener regeneration backwash (brine) with infiltration and inflow of road salt during the winter road maintenance season likely responsible for significant spikes in chloride effluent concentrations in the winter months.

D. Ambient Substance Concentration: Unknown ☐ **Measured** ☐ **Estimated** ☐ **Default** ☒ **Unknown**

E. **If measured or estimated, what was the basis? Include citation.**

F. Average effluent discharge rate: 0.0349 MGD **Maximum effluent discharge rate:** 0.075 MGD (design flow – annual average)

G. Effluent Substance Concentration: 1-day P99 = 618 mg/L; 4-day P99 = 475 mg/L; Mean = 357 mg/L (Jan. 2014 – April 2020) ☒ **Measured** ☐ **Estimated** ☐ **Default** ☐ **Unknown**

If measured or estimated, what was the basis? Include Citation. Values based on chloride data reported from Jan. 2014 – April 2020.

I. Type of HAC:
☐ **Type 1: HAC reflects waterbody/receiving water conditions**
☐ **Type 2: HAC reflects achievable effluent conditions**
☒ **Type 3: HAC reflects current effluent conditions**

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 470 mg/L,

which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's Chloride SRM plan. The current effluent condition is reflective of on-site optimization measures that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for Blue Mounds at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.

K. Variance Limit: 470 mg/L

L. Level currently achievable (LCA): 470 mg/L

M. What data were used to calculate the LCA, and how was the LCA derived? (*Immediate compliance with LCA is required.)*

Results reported on permittee's discharge monitoring reports from 4 consecutive days each month from January 2014 to April 2020.

N. Explain the basis used to determine the variance limit (which must be ≤ LCA). Include citation.

The 4-day P99 (475 mg/L) from discharge monitoring reporting data was greater than the current interim limit of 470 mg/L. Therefore, the previous interim limit is recommended to continue. The limit is established in accordance with s. 283.15 (5), Wis. Stats. and s. NR 106.82(9), Wis. Adm. Code. Chapter NR 106, Subchapter IV, Wis. Adm. Code, allows for a variance; the imposition of a less restrictive interim limit; a compliance schedule that stresses source reduction and public education; and allowance for a target value or limit to be a goal for reduction.

O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below: ☐ **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☒ **6**

The use of a reverse osmosis system was evaluated. The cost of the system was estimated to an average cost per household that would result in a MHI of 2.26%. Installing centralized lime softening on the current municipal water supply system was also evaluated, and the estimated cost of doing so would be about 4.36% of the MHI. The cost estimates are in the range in which the application of either treatment would be expected to result in substantial and widespread economic and social impacts to the community. Without a variance, meeting the water quality standard of 400 mg/L would result in substantial and widespread economic and social impacts.

Section III: Location Information

A. Counties in which water quality is potentially impacted: Dane, Iowa

B. Receiving waterbody at discharge point: Williams – Barneveld Creek

C. Flows into which stream/river? East Brank Pecatonica River **How many miles downstream?** 7.39

D. Coordinates of discharge point (UTM or Lat/Long): Lat: 43.01077º N / Lon: 89.83602º W

E. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the chronic criterion of the substance for aquatic life protection?

The Blue Mounds WWTF discharge is to the headwaters of Williams/Barneveld Creek in Iowa County. Since the effluent concentrations aren't far from the criterion, not much additional dilution will be needed to allow the criterion to be met. It is estimated that compliance with the criterion would occur well before the point of classification change (approx. 2.2 miles downstream of the outfall). The 7-Q10 low flow estimate at the point of classification change is 0.43 cfs compared to 0 cfs at the discharge location. A mass balance using an effluent flow rate of 0.075 MGD (0.116 cfs) at 470 mg/L mixed with 0.43 cfs (assuming complete mixing at the downstream location) gives a mix concentration of 55 mg/L, which is well below the chronic criterion.

F. Provide the equation used to calculate that distance *(Include definitions of all variables, identify the values used for the clarification, and include citation):*

A mass balance equation using an effluent flow rate of 0.075 MGD (0.116 cfs) at 470 mg/L mixed with 0.43 cfs (assuming complete mixing at the downstream location) gives a mix concentration of 55 mg/L.

G. What are the designated uses associated with the direct receiving waterbody, and the designated uses for any downstream waterbodies until the water quality standard is met?

Williams-Barneveld Creek is listed as Limited forage fish community, non-public water supply. The East Branch Pecatonica River is listed as a class 2 trout stream where Williams-Barneveld creek flows into the river 2.2 miles from the point of discharge.

H. Identify all other variance permittees for the same substance which discharge to the same stream, river,

or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: None

Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]
N/A	N/A	N/A	N/A

I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet.

J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. ☐ **Yes** ☒ **No** ☐ **Unknown**

River Mile	Pollutant	Impairment

***K.* Please list any contributors to the POTW in the following categories:**
May need to contact facility for this information

Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	N/A
Metal Plating/Metal Finishing	N/A
Car Washes	N/A
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	N/A
Laundromats	One local laundromat.
Other presumed commercial or industrial chloride contributors to the POTW	N/A

L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe.
There is currently no sewer use ordinance enacted to address chloride contributions from industrial or commercial users.

Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)

A. Are there any industrial users contributing chloride to the POTW? If so, please list.
N/A – Blue Mounds does not have an approved pretreatment program.

B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc)
N/A

C. When were local pretreatment limits for chloride last calculated?
N/A

D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW
N/A

Section V: Public Notice

A. Has a public notice been given for this proposed variance? ☐ **Yes** ☐ **No**
B. If yes, was a public hearing held as well? ☐ **Yes** ☐ **No** ☐ **N/A**

C. What type of notice was given?
☐ **Notice of variance included in notice for permit** ☐ **Separate notice of variance**

D. Date of public notice: _____ **Date of hearing:** _____

E. Were comments received from the public in regards to this notice or hearing? *(If yes, see notice of final determination)* ☐ **Yes** ☐ **No**

Section VI: Human Health

A. Is the receiving water designated as a Public Water Supply? ☐ **Yes** ☒ **No**

B. Applicable criteria affected by variance: No human health criteria for chloride

C. Identify any expected impacts that the variance may have upon human health, and include any citations:
None

Section VII: Aquatic Life and Environmental Impact

A. Aquatic life use designation of receiving water: Limited Forage fish

B. Applicable criteria affected by variance: Chronic toxicity criteria for chloride = 395 mg/L from NR 105, applicable in all waters in Wisconsin.

C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations:
The proposed interim limit of 470 mg/L results in an instream concentration of 470 mg/L at the edge of the regulatory mixing zone since the 7Q10 is 0 cfs. Because of the lack of dilution, the instream concentration associated with the proposed interim limit is equal to the concentrations in the effluent. This concentration only exceeds the genus mean chronic value for one species; the Ceriodaphnia (417 mg/L).

D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations:
None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.

Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)

Section VIII: Economic Impact and Feasibility

A. Describe the permittee's current pollutant control technology in the treatment process: The village uses an activated sludge-oxidation ditch with final clarification. Sludge handling and treatment consists of gravity settling, and aerobic digestion. The Village of Blue Mounds currently does not have any treatment capabilities for chloride removal.

B. What modifications would be necessary to comply with the current limits? Include any citations.
Reverse osmosis (RO) would need to be constructed as a tertiary process. The concentrated chloride brine would need to be sent to another treatment plant for disposal. The additional cost of a RO process including capital cost and O&M cost was estimated to result in an average total sewer cost to household that would be 2.26% of the median household income. Additionally, lime softening could be installed at the drinking water source which would remove the need for individual household water softeners; however, the estimated cost would result in an average total sewer cost to household that would be 4.36% of the median household income.

C. How long would it take to implement these changes?
Since economics is the limiting factor it is unknown how long it would take to implement.

D. Estimate the capital cost *(Citation)***:** $84,375 (Variance Application and adjusted for design flow of the facility instead of actual flow)

E. Estimate additional O & M cost *(Citation)***:** $27,375 (Variance Application and adjusted for design flow of the facility instead of actual flow)

F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:
Reverse osmosis wastewater treatment systems can be operated to achieve levels of chloride below the water quality standard of 395 mg/L. Municipal lime softening systems do not generate chloride waste as ion-exchange softening systems do, thus the concentration of chloride in the WWTF's discharge would be expected to be at levels below the water quality standard with a municipal lime softening system. However, neither of these technologies is economically feasible for the village at this time.

G. Identify any expected environmental impacts that would result from further treatment, and include any citations:

End-of-pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of an environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end-of-pipe treatment in most cases, since the end product of treatment (production of a concentrated brine) does not remove the load of chloride from the environment.

There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.

H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge? ☐ **Yes** ☒ **No** ☐ **Unknown**

Reverse Osmosis treatment of the Village of Blue Mounds WWTF effluent to meet the WQBEL is technically feasible. However, it is not economically feasible. Use of reverse osmosis at the WWTF was evaluated (see DNR screening tool for costs); the resulting total cost for sewer user rates was estimated to result in an average cost to households that would be 2.26% of the MHI. An increase of this magnitude would cause substantial and wide spread adverse social and economic impacts the area where the discharge is located.

Lime softening treatment of the village's water supply is technically feasible and would likely enable the WWTF effluent to meet the chloride WQBEL. However, lime softening is not economically feasible. See the Chloride Variance Economic Eligibility Tool (Lime Softening) screening tool for costs of lime softening. Use of municipal lime softening was evaluated; the resulting cost for sewer user rates was estimated to result in an average cost to households that would be 4.36% of the MHI. An increase of this magnitude would cause substantial and wide spread adverse social and economic impacts the area where the discharge is located.

I. If treatment is possible, is it possible to comply with the limits on the substance? ☐ **Yes** ☒ **No** ☐ **Unknown**

J. If yes, what prevents this from being done? Include any citations.

N/A

K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Reverse osmosis at the facility and centralized lime softening of drinking water. Both alternatives to current practices have been rejected as they are economically infeasible.

Section IX: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

Past and Current: Source reduction measures include: educating homeowners on the impact of chloride from residential softeners and discussing options for increasing softener salt efficiency, recommending residential softener tune-ups, requesting voluntary support from local water softening businesses, and educating licensed installers and self-installers of softeners on providing optional hard water for outside faucets for residences.

Found High Chloride Dischargers: In early 2015, monthly average effluent chloride concentration reached a peak in February of 605 mg/L. Prior to this point average summer chlorides concentrations were approximately 350 mg/L. After investigating the rising chloride concentrations, the Village was able to identify the source – a large water softener at the local laundromat.

It was discovered that sewer users within the manufactured home park had begun placing softener salts in toilet fixtures as an attempt to keep lines from freezing. Once word of this practice reached the Village staff, they were able to quickly educate residents of the issues this causes at the WWTF and instructed them of alternative ways to prevent freezing water lines at the homes.

Infiltration & Inflow Reduction: The Village has targeted deicing practices as a source reduction due to inflow and infiltration (I&I) to the wastewater collection system. The Village ensures that all street construction or repair projects involve replacement of all existing manhole castings with new gasketed closed pick-hole castings

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

The permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of the variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the permit, (b) implement the chloride source reduction measures specified below, (c) follow the submitted Source Reduction Measures Plan dated May 2019, and (d) perform the actions listed in the schedule.

1. Select village public works employees to complete chloride training to increase knowledge on potential chlorides reduction measures.
2. Create village welcome packet for new residents that includes information on reducing chlorides
3. Mail chloride educational pamphlet with sewer customers' sewer bills annually. Post chlorides educational pamphlet on website.
4. Offer tours of the WWTF to help educate about the issues excess chlorides cause downstream.
5. Encourage local winter maintenance professionals to participate in City of Madison's Winter Salt Certification Program
6. Survey residents on water softening equipment and practices. Survey could be conducted by village's building inspectors and local plumbers.
7. Meet with all industrial & commercial customers to evaluate and document softening equipment.
8. Continue rehabilitation of sanitary manholes, and record information as part of the village's Capacity, Management, Operation, and Maintenance (CMOM) program.
9. Submit annual updates to DNR describing work completed on the village's chlorides source reduction measures.
10. Continue accepting softener brine tanks for disposal, free of charge to Village residents to reduce cost of replacing waster softeners.
11. Enforce ordinance regarding on demand softener efficiency standards for new construction and replacement.

Citation: Village of Blue Mounds Chloride Source Reduction Measures Plan, Town and County Engineers, May 2019

Section X: Compliance with Previous Permit *(Variance Reissuances Only)*

A. Date of previous submittal: November 12, 2013 **Date of EPA Approval:** December 23, 2013

B. Previous Permit #: WI-0031658-07 **Previous WQSTS #:** (EPA USE ONLY)

C. Effluent substance concentration: 475 mg/L **Variance Limit:** 470 mg/L

D. Target Value(s): 400 mg/L **Achieved?** ☐ **Yes** ☒ **No** ☐ **Partial**

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Identify sources of chloride to the sewer system	☒ **Yes** ☐ **No**
Educate homeowners on the impact of chloride from residential softeners; discuss options available for increasing softener salt efficiency and request voluntary reductions.	☒ **Yes** ☐ **No**
Recommend residential softener tune-ups on a voluntary basis.	☒ **Yes** ☐ **No**
Request voluntary support from local water softening businesses in the efforts described above.	☒ **Yes** ☐ **No**
Educate licensed installers and self-installers of softeners on providing optional hard water for outside	☒ **Yes** ☐ **No**

faucets for residences.	
Investigate streets and other areas that require high salt use in winter whereby salt is entering the collections system and conduct appropriate maintenance.	☐ **Yes** ☒ **No** No specific street and wastewater collection system projects have been completed solely aimed at reducing chlorides, however the village ensures that all street construction or repair projects involve replacement of all existing manhole castings with new gasketed closed pick-hole castings.
Mandate a DIR [demand-initiated regeneration] and high salt efficiency standard for new residential softeners.	☒ **Yes** ☐ **No**
Mandate participation in a residential softener tune-up program, which involves qualified periodic servicing to ensure proper control settings and adjustments.	☐ **Yes** ☒ **No**